Comments on ENWL DCP 161 case study

by Franck Latrémolière on Friday 25 July 2014

1. This attachment provides some additional analysis of the case study to be included in the DCP 161 change report.

Does the case study establish a need for reinforcement?

2. The case study states that the primary substation running above firm capacity. However, the data table only shows "Firm Capacity (MVA) Based on Continuous Rating for Season".

3. There is no disclosure of the pattern of load for the substation. If the daily profile of demand is peaky and the transformers are capable of operating at a higher load level than the continuous rating for a few hours each day, then the relevant measure of firm capacity will be more than the Firm Capacity (MVA) Based on Continuous Rating for Season.

4. Presumably the distributor is currently in compliance with the P2/6 standard. This suggests that the load on the substation is not regularly exceeding the relevant measure of firm capacity.

5. There is no information on how much headroom actually exists between current maximum load levels and the relevant measure of firm capacity.

What is the cost to the DNO of the additional network use in the case study?

6. Assuming that it is correct that the load on the substation is not regularly exceeding the relevant measure of firm capacity, the costs to the DNO of exceeded capacity are limited to additional equipment wear from higher loads.

7. The case study does not identify any investment or reinforcement cost that is caused by the unauthorised network use.

How does DCP 161 affect the charges for additional network use?

8. Assuming that the customer in the case study is on a standard HV HH Metered tariff, its current tariff is:

   (a) 10.751 p/kWh for 522 hours a year in the red time band (about 56.8 per cent of this comes from revenue matching rather than an allocation of distribution costs).

   (b) 0.731 p/kWh for 2,687.5 hours a year in the amber time band (41.4 per cent of this is from revenue matching).

   (c) 0.113 p/kWh for 5,550.5 hours a year in the green time band (51 per cent of this is from revenue matching).

   (d) 96.60 p/day.

(e) 3.06 p/kVA/day.

(f) 0.249 p/kVArh beyond 0.95 power factor.

9. If DCP 161 had been implemented, the unit rates would be reduced by a small amount (less than 1 per cent), and the exceeded capacity charge would be more than double: 6.58 p/kVA/day.

10. The average exceeded capacity in the case study is 1,694 kVA. Under the current rules, the exceeded capacity charge is £18,920 a year. DCP 161 would increase this to £40,685: an additional £21,765 a year.

11. There is no disclosure in the case study of the time of day at which exceeded capacity occurs, or of the balance between active and reactive power. But the apparent correlation between exceeded capacity levels and the substation maximum demand (which is most likely to occur in the red or amber time band) suggests that at least part of the exceeded capacity is associated with active power consumption in the red or amber time bands.

12. As an illustration, assume that the 1,694 kVA of exceeded capacity is associated with an additional 1,500 kW consumption for one hour in the red time band each weekday (261 hours a year). Then the unit rate payable for this additional consumption comes to 0.10751*1500*261 = £42,090 a year. Out of this amount, 56.8 per cent or £23,907 a year is "revenue matching" charged over and above the allocation of network costs.

13. Overall, therefore, the additional consumption (over and above agreed capacity) might be bringing additional revenues of the order of £20,000–£40,000 a year to the DNO without DCP 161, and additional revenues of the order of £40,000–£60,000 a year with DCP 161.

Does DCP 161 incentivise the customer to seek a higher maximum import capacity?

14. There is no information in the case study about the costs of reinforcing the network.

15. Assume that the primary substation is two-transformer configuration, and that the only sensible way to upgrade it is to double its firm capacity by installed a third transformer.

16. Assume that the cost of installing that transformer and a few miles of 33kV feeder to supply it would be £4.6 million, and that the relevant measure of post-upgrade firm capacity is 46 MVA (two times 23 MVA, including any relevant overload capability).

17. If the unauthorised use by the customer exceeding its capacity was leading the distributor to make that investment, then use of system charges including exceeded capacity charges, with or without DCP 161, do not come close to funding this investment: £60,000 a year is not an adequate return on a £4.6 million investment. If P2/6 compliance was jeopardised by the excess consumption, then the only reasonable course of conduct open to the DNO would be to enforce the maximum import capacity (e.g. by fitting current limiting equipment) so as to force the customer to choose between seeking an upgraded connection or reducing its demand.

18. If the investment is triggered by a request for an upgraded connection or for a new connection in the area, then the connection charge would be of the order of £100/kVA under the apportionment rule (£4.6 million spread over 46 MVA).

19. From the exceeding customer's point of view, the economics of seeking an upgraded connection are as follows:

    (a) Without DCP 161, there is no benefit in seeking an upgraded connection unless the DNO enforces the maximum import capacity.

    (b) With DCP 161, seeking an additional 4,300 kVA of capacity would save £21,765 a year. But if the DNO considers that reinforcement is necessary, then the likely capital outlay (connection charge) for this is of the order of £430,000. This is a rate of return on investment of only 5 per cent, which is unlikely to be attractive unless the customer is very certain of its long-term electricity needs.

20. Thus, on this example, DCP 161 would probably not provide an effective incentive to contribute to network reinforcement by seeking an upgraded connection.

Does DCP 161 protect the interests of new connectees?

21. From the point of view of a potential new customer in the area, there might be a perceived risk that the use of exceeded capacity by the existing customer could mean that the £100/kVA reinforcement is triggered for a 2 MVA project, even through if the existing customers were complying with their maximum import capacity then there would be more than 2 MVA space capacity available on the primary. DCP 161 might be seen as a way of alleviating that risk.

22. In fact, that perceived risk does not exist, and the logic for it rests on a misunderstanding of the connection charging methodology. If a potential customer asks for a 2 MVA connection, the DNO has to design the minimum scheme to provide that capacity. In the context of the case study, fitting current limiting equipment on the existing customer is obviously a cheaper way of doing that (in terms of the "lowest overall capital cost") than upgrading the primary substation.

23. The DNO is also prohibited from discriminating between persons or classes of persons in providing connections and use of system. A DNO that insisted that the new customer intending to consume 2 MW needs to contribute to the primary substation reinforcement through its connection charge, at the same time as failing to enforce the maximum import capacity on the existing customer, would be in breach of this prohibition since it would be taking a significantly harsher approach to enforcing capacity limits on new customers than on existing customers.

24. Thus, on the example presented above, DCP 161 does not protect the interests of new connectees any better than the status quo (assuming that the DNO complies with its connection charging methodology and its licence obligations).